Greetings and welcome to the SEPTEMBER **2013** edition of the WDFW Climate News Digest. The purpose of this digest is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming. Note that previous editions of the newsletter are now stored on the Habitat Program Sharepoint site -- http://sharepoint.dis.wa.gov/dfw/habitat/climatechange/default.aspx.

Special thanks this month for contributions from David Patte (USFWS), Daniel Rawdling, Bruce Botka, Ann Potter, Gary Wiles, Perry Harvester, Hal Beecher, Don Doty, Bob Vadas and Brian Williams.

WHAT'S HAPPENING AT WDFW?

Chair of the President's Council on Environmental Quality tours Washington to learn about climate resiliency

WDFW staff Brian William and Belinda Rotton participated in a recent tour by Nancy Sutley, Chair of the White House Council on Environmental Quality (CEQ) and a principal environmental policy adviser to the President. The purpose of the tour was to learn about local efforts related to climate resiliency and adaptation and to visit sites that would help CEQ staff to understand the risks of climate change in the region. The tour included TNC's Fisher Slough and WDFW's Fir Island Farm restoration projects where the discussion primarily focused on the importance of collaborative partnerships and coordinated federal funding to our efforts to successfully implement critical ESA related habitat restoration, protect the agriculture industry, and prepare for the significant future climate changes predicted for the Skagit River watershed. For more information contact Brian.

Draft Tufted Puffin status review for Washington includes climate change risk

Co-authored by Gary Wiles of the Listing and Species Recovery Section of WDFW, the draft status review recommends that Tufted Puffins be listed as a State Endangered species. Among the many factors that may contribute to the species' decline, the report suggests that "shifting weather patterns and rising sea temperatures predicted by climate change models could have a dramatic impact on the productivity and occupancy of established puffin colonies, as well as the establishment of new ones." After internal review, the status review will go for outside peer review followed by a 90-day public review period and the final report will then be sent to the Fish and Wildlife Commission for a decision on the recommendation to list the species as endangered in Washington. For a copy of the full report or for questions, please contact Gary.

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

Washington State Department of Health – Secretary establishes a climate change lead and workgroup

Secretary of Health John Weisman recently sent an email to all agency staff indicating his commitment to address climate change (excerpt follows) -- "As you know, one of my priorities coming into this job was clarifying our public health role in climate change. I was impressed with the breadth of knowledge, ideas and excitement members of the scoping team had for this topic. We decided at that initial meeting

that the next step would be to ask the Senior Management Team (SMT) to identify a Department of Health climate change lead. I'm pleased that Jerrod Davis, Office Director for Shellfish and Water Protection, has agreed to take on the role of climate change lead along with his other duties. Jerrod has a real interest in the topic and his office is currently facing climate changes challenges with ocean acidification and increased harmful algae blooms all severely impacting shellfish growers. I hope you will take time to read the following article emphasizing the importance of public health's role in climate change. I think you will find it valuable and informative.

Rebranding climate change as a public health issue.

According to a recent study, framing global warming as a public health issue rather than as an environmental or national security one produces the most emotionally compelling response among people, since it focuses on the immediate implications a warmer climate could have on people's lives. Time Magazine.

[See the study: A public health frame arouses hopeful emotions about climate change]

LEARNING OPPORTUNITIES

September 10, 11:00-noon (Pacific Time), "Wetlands as Sentinels and Mitigators of Climate Change", Dr. Judith Drexler, from the USGS California Water Science Center. NCTC Conservation Science and Policy Webinar Register here

September 10th, 10:00 AM (Pacific time); the second of a series of webinars on the **WGA/LCC Riparian Mapping Project** - an effort to develop high-resolution maps of potential riparian areas, their condition, and their climate adaptation potential, for the Pacific Northwest. Contact Meade Krosby to receive Webex information and a reminder shortly before the webinar.

September 17, 1:00-2:30 pm (Pacific Time), "Climate in the Pacific Northwest – A Primer". Lara Whitely Binder from the UW Climate Impacts Group will provide an overview of climate change and specifics on its effects in the Pacific Northwest for urban planners, students, educators, policy makers, and others interested in learning more about climate in the region. She will be joined by representatives from the Washington State Department of Ecology, Pacific Northwest Tribal Climate Consortium, and the Alliance for Climate Education (student speaker) who will provide background about their organizations and the resources they offer. The webinar will focus on research in four key sectors: water resources, aquatic and marine ecosystems, forests, and coasts. Register: https://www2.gotomeeting.com/register/198478714

September 25, 10:00 a.m., (Pacific Time), "What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure" by Heidi Stiller of NOAA. The new report "What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure" provides a framework that community leaders and planners can use to make more economically informed decisions about adapting to sea level rise and storm flooding. The four-step framework can be used to perform a holistic assessment of costs and benefits across a community, or to focus in on select infrastructure. This webinar will provide an overview of the framework as well as provide information on the expertise needed for steps in the process. Read the report at www.csc.noaa.gov/digitalcoast/publications/adaptation. **Register for the webinar at https://www1.gotomeeting.com/register/897545937.**

September 25, 11:00-3:00 p.m., (Pacific Time), "Building Business Resilience to Climate Change: Weyerhaeuser". This webinar will take a detailed look at resilience planning at one of the world's leading forestry companies. Sara Kendall will discuss Weyerhaeuser's strategic initiatives, opportunities, and challenges for building resilience to the impacts of a changing climate on forestry and land use. Reserve your Webinar seat now at: https://www4.gotomeeting.com/register/674795351

October 3, 12:30 p.m. (Pacific Time) Climate change and Rocky Mountain ungulates, Mattew Kauffman, USGS Wyoming Cooperative Fish and Wildlife Unit. National Climate Change and Wildife Science Center Webinar Many ungulate populations in the Rocky Mountains are predicted to respond to declining snow levels and increased drought, though in ways that remain uncertain. We are investigating how climate change may affect the abundance of Rocky Mountain ungulates, their migration patterns, the degree to which they transmit diseases to livestock, and their herbivory impact on aspen (Populus tremuloides. Learn more and register here.

November 14, 10:00 a.m., (Pacific Time), "Impacts of Sea Level Rise on National Parks", by Rebecca Beavers and Courtney Schupp of the US National Park Service. Climate change and sea level rise will challenge National Park efforts to protect natural and cultural resources and to provide visitor access and recreational opportunities. Learn how several national parks are addressing these challenges: collecting baseline data on archaeological sites that are vulnerable to rising water levels and associated changes in biological activity and visitor use; incorporating barrier island processes into long-term development plans including visitor facilities; and engaging in a regional multi-agency effort to restore coastal areas impacted by a major hurricane. **Register for the webinar at https://www1.gotomeeting.com/register/846023408.**

December 12, 10:00 a.m.,(Pacific Time), "Assessing Habitat and Community Sensitivity to Climate Change Impacts", by Jeff Crooks of the Tijuana River National Estuarine Research Reserve and Dwight Trueblood of NOAA. The National Estuarine Research Reserves (NERRS) are uniquely positioned across the U.S. to assess climate change impacts and the sensitivity of representative coastal habitats to them. The NERRS Climate Sensitivity Study identified key anthropogenic and climatic stressors affecting each reserve's ecological and social landscape and then analyzed the social and bio-physical sensitivity to these stressors. Presenters will share key findings from this study, and the Tijuana River Reserve in California will discuss their collaborative efforts to develop a vulnerability assessment that informs an Adaptation Strategy to address sea level rise and riverine flooding. **Register for the webinar at https://www1.gotomeeting.com/register/858423992.**

RECORDED WEBINARS

"Pikas in the Columbia Gorge": if you missed last week's presentation, see the recording at the C3 site: http://www.youtube.com/watch?v=ISZz5O_fJaM

RESOURCES

Recent NOAA report highlights climate change threats to nation's estuaries

The national study, Climate Sensitivity of the National Estuarine Research Reserve System, examines some of the factors that make estuaries and the communities dependent on estuarine resources susceptible to climate change. The work is focused in the National Estuarine Research Reserve System

(NERRS) a collection of 28 reserves located around the U.S. and Puerto Rico, which are managed as a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states for long-term research, ecosystem monitoring, education, and coastal stewardship. To our knowledge, this is the first national climate sensitivity analysis of U.S. estuaries and it is unique in that it examines both the biophysical and socio-demographic sensitivities of reserve sites to climate change. The report provides management recommendations based on its key findings.
Full
Report: http://nerrs.noaa.gov/Doc/PDF/Research/130725_climate%20sensitivity%20of%20nerrs_Final-Rpt-in-Layout_FINAL.pdf

Coastal adaptation with ecological engineering

The use of combined approaches to coastal adaptation in lieu of a single strategy, such as sea-wall construction, allows for better preparation for a highly uncertain and dynamic coastal environment. Although general principles such as mainstreaming and no- or low-regret options exist to guide coastal adaptation and provide the framework in which combined approaches operate, few have examined the interactions, synergistic effects and benefits of combined approaches to adaptation. This Perspective provides three examples of ecological engineering — marshes, mangroves and oyster reefs — and illustrates how the combination of ecology and engineering works. *(Cheong et al., Nature Climate Change, vol 3, 787-791, 2013 DOI: 10.1038/NCLIMATE1854)*

CLIMATE SCIENCE NEWS

2012 State of the Climate report released (available **online**) **-- 2012 was one of the 10 warmest years on record globally**

The end of weak La Niña, unprecedented Arctic warmth influenced 2012 climate conditions
Worldwide, 2012 was among the 10 warmest years on record according to the *2012 State of the Climate* report released online today by the American Meteorological Society (AMS). The peer-reviewed report, with scientists from **NOAA's National Climatic Data Center** in Asheville, N.C., serving as lead editors, was compiled by 384 scientists from 52 countries (**highlights**, **full report**). It provides a detailed update on global climate indicators, notable weather events, and other data collected by environmental monitoring stations and instruments on land, sea, ice, and sky.

Climate Panel Cites Near Certainty on Warming

(excerpt from the New York Times published August 19th, 2013)
An international panel of scientists has found with near certainty that human activity is the cause of most of the temperature increases of recent decades, and warns that sea levels could conceivably rise by more than three feet by the end of the century if emissions continue at a runaway pace. The scientists, whose findings are reported in a draft summary of the next big United Nations climate report, largely dismiss a recent slowdown in the pace of warming, which is often cited by climate change doubters, attributing it most likely to short-term factors. The report emphasizes that the basic facts about future climate change are more established than ever, justifying the rise in global concern. It also reiterates that the consequences of escalating emissions are likely to be profound. The draft comes from the Intergovernmental Panel on Climate Change, a body of several hundred scientists that won the Nobel Peace Prize in 2007, along with Al Gore. Its summaries, published every five or six years, are considered the definitive assessment of the risks of climate change, and they influence the actions of governments around the world. Hundreds of billions of dollars are being spent on efforts to reduce greenhouse emissions, for instance, largely on the basis of the group's findings.

Past Decade Saw Unprecedented Warming in the Deep Ocean

(This summary is from Eos, Vol. 94, No. 32, 6 August 2013)

Since 1975 the global surface ocean has shown a pronounced—though wavering— warming trend. Starting in 2004, however, that warming seemed to stall. Researchers measuring the Earth's total energy budget—the balance of sunlight streaming in compared to the amount of light and heat leaving from the top of the atmosphere—saw that the planet was still holding on to more heat than it was letting out. However, with that energy not warming the surface ocean—a traditionally important energy sink—scientists were not sure where it went. It became known, in some circles, as a case of "missing heat." Through a reanalysis of global ocean heat content measurements, *Balmaseda et al.* found the missing heat. The authors show that though the upper ocean waters, from the surface to 700 meters depth, showed no warming from 2004 to 2008, the waters from 700 to 2000 meters were warming at an unprecedented rate. They found that during the past decade, of the excess energy trapped by the anthropogenic greenhouse effect that has gone into warming the ocean, 30% of it has contributed to warming the deep ocean. *(Balmaseda et al., 2013, Distinctive climate signals in reanalysis of global ocean heat content, Geophysical Research Letters, 40, 1754–1759, doi:10.1002/grl.50382)*

SPECIES AND HABITATS

Steelhead vulnerability to climate change in the Pacific Northwest (article attached), Wade et al, Journal of Applied Ecology 2013 doi: 10.1111/1365-2664.12137

(excerpt from the article summary) – Steelhead and other Pacific salmon are threatened by unsustainable levels of harvest, genetic introgression from hatchery stocks and degradation or loss of freshwater habitat. Projected climate change is expected to further stress salmon through increases in stream temperatures and altered stream flows. We demonstrate a spatially explicit method for assessing salmon vulnerability to projected climatic changes applied here to steelhead salmon across the entire Pacific Northwest (PNW). We considered steelhead exposure to increased temperatures and more extreme high and low flows during four of their primary freshwater life stages: adult migration, spawning, incubation and rearing. Restoring connectivity of floodplains and high elevation habitats is indicated as a primary mitigative measure to ensure persistence (article attached).

Hotter, Drier Conditions Forcing Desert Plants To Migrate

Desert plants living in Arizona's Santa Catalina Mountains have moved surprisingly far upslope in the past 50 years, a trend that's likely due to warmer, drier temperatures in the region, new research has found. The study, led by researchers from the University of Arizona, surveyed the locations of desert trees and shrubs that grow along the Catalina Highway, which stretches from desert lowlands to the top of Mount Lemmon in the Santa Catalina Mountains. Researchers compared the present-day data to a 1963 survey of plant life along the road. The results were striking: of the 27 most common plant species found along the road, 15 had shifted their lower boundaries upslope, and eight of those shifted more than 800 feet upward from their 1963 lowermost boundaries.

We've been asking the wrong questions about conservation

"Stop worrying about how species will respond to climate change – focus on how our adaptations are going to affect them", James Watson, theguardian.com

In looking at how best to protect wildlife from the growing climate change crisis, conservation scientists usually ignore the single most significant impact on fauna and flora: the changes warming drives in the behaviour of its dominant species – humans – and resultant effects on the living world and natural

processes. Those effects are already driving many of the climate-related ecological shifts we are witnessing across the globe.

Projecting responses to climate change: adult and juvenile survival respond differently to direct and indirect effects of weather in a passerine population

Projecting demographic responses to climate change can identify not only how populations will be affected by climate change but also indicate the demographic process(es) and specific mechanisms that may be responsible. This information can, in turn, inform climate change adaptation plans, help prioritize future research, and identify where limited conservation resources will be most effectively and efficiently spent. Using a long-term mark-recapture data set, researchers examined the influence of multiple direct and indirect effects of weather on adult and juvenile survival for a population of Song Sparrows in California. They found evidence for a positive, direct effect of winter temperature on adult survival, and a positive, indirect effect of prior rainy season precipitation on juvenile survival, which was consistent with an effect of precipitation on food availability during the breeding season. These relationships were then used with climate projections of significantly warmer and slightly drier winter weather by the year 2100, to project a significant increase in mean adult survival (12–17%) and a slight decrease in mean juvenile survival (4–6%) under the B1 and A2 climate change scenarios. *(Kristen E. Dybala, John M. Eadie, Thomas Gardali, Nathaniel E. Seavy, Mark P. Herzog. Global Change Biology, 2013; 19 (9): 2688 DOI: 10.1111/gcb.12228)*

Riparian Ecosystems in the 21st Century: Hotspots for Climate Change Adaptation?

Current knowledge is synthesized on the vulnerability of riparian ecosystems to climate change by assessing the potential exposure, sensitivity, and adaptive capacity of their key components and processes, as well as ecosystem functions, goods and services, to projected global climatic changes. The authors review key pathways for ecological and human adaptation for the maintenance, restoration and enhancement of riparian ecosystem functions, goods and services and present emerging principles for planned adaptation. The synthesis suggests that, in the absence of adaptation, riparian ecosystems are likely to be highly vulnerable to climate change impacts. However, given the critical role of riparian ecosystem functions in landscapes, as well as the strong links between riparian ecosystems and human well-being, considerable means, motives and opportunities for strategically planned adaptation to climate change also exist. *(Capon et al., Ecosystems, April 2013, Volume 16, Issue 3, pp 359-381, DOI: 10.1007/s10021-013-9656-1)*

Ecosystems: Climate change must not blow conservation off course (article attached)

Nature 500, 7462 (2013).
http://www.nature.com.d2.nal.usda.gov/nature/journal/v500/n7462/pdf/500271a.pdf, Authors: Morgan W. Tingley, Lyndon D. Estes & David S. Wilcove
From the article: "Although climate change seems likely to wreak havoc on biodiversity, as is already happening in some places, its precise effects are difficult to predict. In the meantime, numerous threats that are better understood and more immediate — notably, the direct destruction of habitats — continue to drive species towards extinction.
The best conservation response to global warming is not to beat an orderly retreat while saving the strongest, but to consider climate change as one of a suite of maladies, all of which must be addressed to protect biodiversity. In some cases climate change may be the most urgent threat; in most cases it is not.

Climate Change and the Past, Present, and Future of Biotic Interactions

Jessica L. Blois,1* Phoebe L. Zarnetske,2 Matthew C. Fitzpatrick,3 Seth Finnegan4
"Biotic interactions drive key ecological and evolutionary processes and mediate ecosystem responses to climate change. The direction, frequency, and intensity of biotic interactions can in turn be altered by climate change. Understanding the complex interplay between climate and biotic interactions is thus essential for fully anticipating how ecosystems will respond to the fast rates of current warming, which are unprecedented since the end of the last glacial period. We highlight episodes of climate change that have disrupted ecosystems and trophic interactions over time scales ranging from years to millennia by changing species' relative abundances and geographic ranges, causing extinctions, and creating transient and novel communities dominated by generalist species and interactions."
http://www.noaanews.noaa.gov/stories2013/20130807_nerrclimatereport.html

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

National Geographic September issue -- cover story on sea level rise.
http://ngm.nationalgeographic.com/2013/09/rising-seas/folger-text

New Guidance on the Economics of Climate Adaptation
The Coastal Services Center has released a new report entitled "What Will Adaptation Cost? An Economic Framework for Coastal Community Infrastructure" (www.csc.noaa.gov/digitalcoast/publications/adaptation). The report provides a framework that community leaders and planners can use to make more economically informed decisions about adapting to sea level rise and storm flooding. The four-step framework can be used to perform a holistic assessment of costs and benefits across a community, or to focus in on select infrastructure. The report also discusses the expertise needed at each step in the process.
NOTE: The Center is looking for communities interested in piloting the framework. They are not able to fund the pilot projects, but they may be able to provide some technical assistance.

Idaho Farmers talk about climate change
(excerpt from CapitalPress)
Several Idaho farmers told Boise residents that extreme weather and drought are negatively impacting Idaho agriculture, and asked them to support efforts to combat climate change. They joined elected officials and other food industry representatives during a presentation at the Boise Farmers Market designed to raise awareness of climate change and support efforts to limit carbon emissions. Sixth-generation farmer Chance Requa of Twin Falls told the dozens of people gathered for the hour-long event that unpredictable weather in recent years has caused him to drop a few crops, including peas. He said the extreme heat in Idaho the past few summers has also caused a significant reduction in his dry bean yields and unpredictable weather patterns have made farming a challenge in recent years. "If we don't all get smarter about how we deal with carbon, then it's only going to get harder," he said.

Task force: Coasts should prepare for rising seas
Seattle Times – 8/20/13
A presidential task force charged with developing a strategy for rebuilding areas damaged by Superstorm Sandy has issued a report recommending 69 policy initiatives, most focused on a simple warning: Plan for future storms in an age of climate change and rising sea levels. The report released Monday by the Hurricane Sandy Rebuilding Task Force says coastal communities should assume floods

are going to happen more frequently and realize that spending more now on protective measures could save money later.

Connecticut Insurance Companies Now Required by State to Complete Climate Risk Survey

Connecticut-based insurance companies have until August 30, 2013 to complete a Climate Risk Disclosure Survey under a new mandate issued by the State of Connecticut. The Connecticut Insurance Commissioner announced on July 17th that the companies will now be required to complete the annual report, which was initially adopted in 2009 as a voluntary measure by the National Association of Insurance Commissioners. Connecticut joins four other states in making response to the survey mandatory for licensed companies that are writing annual premiums of more than $100 million. The other states are California, Minnesota, New York, and Washington.